Small Business Innovation Research/Small Business Tech Transfer

Space-Qualifiable High Reliability Frequency-Stabilized CW Laser Source, Phase I

Completed Technology Project (2009 - 2009)

Project Introduction

We propose the development and space qualification of a high reliability frequency-stabilized CW laser source at 1064 nm wavelength region to satisfy the requirements of this SBIR subtopic opportunity. Our recommended approach is based on extensive experience developing and using single frequency laser source in the near infrared, both for NASA, DoD and aerospace/commercial applications. Our technical approach built on emerging technology spawned by the telecom industry, which has reached it maturity level such that space qualification of the propose laser can be undertaken. NASA requires proposed laser source for various missions under planning, including LISA, ICESat, LIST, etc.

Anticipated Benefits

Potential commercial applications include: 1) Laboratory use of frequency-stabilized lasers; 2) Developmental work on the future flight systems; 3) Ground based telescope with adaptive optics; 4) Interferometry; 5) Spectroscopy instrumentation and science requiring an absolute wavelength standard; 6) Dye laser replacement scientific lasers; 7) injection seed laser requiring ultra-stable frequency stability. NASA has been planning many space missions, in which a space-qualifiable high reliability frequency-stabilized CW laser source will play an important role. These missions include LISA (Laser Interferometric Space Antenna), ICESat (Ice, Cloud and land Elevation Satellite), LIST (Doppler Wind Lidar, Lidar for Surface Topography) ASCENDS (Earth and planetary atmospheric composition) and upgraded GRACE (Gravity Recovery and Climate Experiments), terrestrial and space-based distributed aperture telescopes, interferometric instruments such as SIM and TFP (Space Interferometer Mission and Terrestrial Planet Finder) and general space-based metrology. All of these missions require laser sources with space qualification, high reliability, frequency stabilized having wavelengths in the region between 1.06 micron and 1.5 micron. Several near-term missions also require single frequency seed or local oscillator laser source with MHz linewidth, the requirement the proposed laser source can meet. These missions include global Doppler winds lidar and coherent sensing of atmospheric constituents such as CO2 and water vapor.

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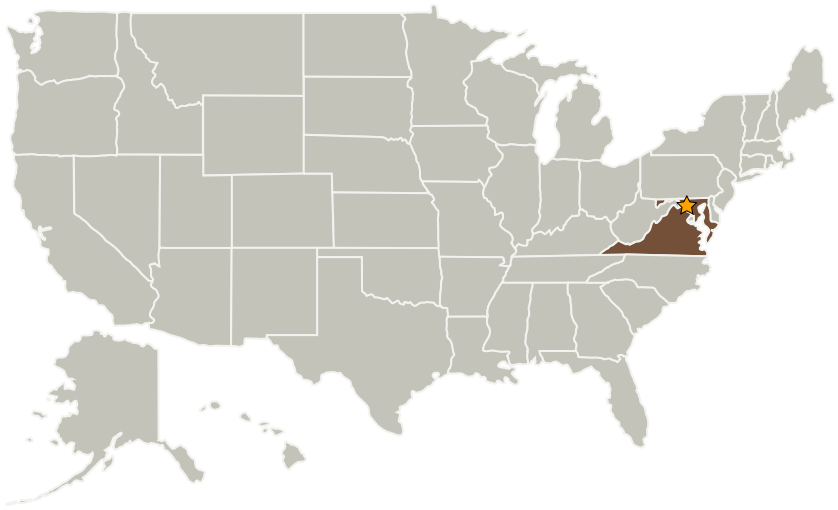
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Metis Technology Solutions, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Albuquerque, New Mexico

Primary U.S. Work Locations	
Maryland	Virginia

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Jordan B Camp

Principal Investigator:

Ti Chuang

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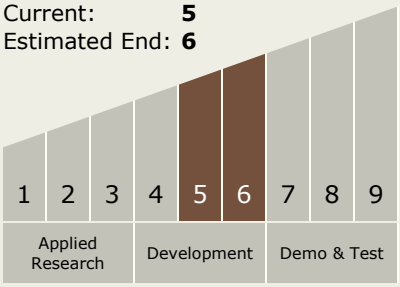
Technology Maturity (TRL)

Start: **5**
Current: **5**
Estimated End: **6**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers